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In the present cases the phosphoric acid was in the mylodon 26.59 and the man 20.77, while the fluorine was respectively 0.28 and 0.38, making the ratio between them, for the mylodon 94.96, for the man 54.70. Referring to page 455, we will see this test applied to the discoveries of Billancourt. There the two fossil bones were respectively 23.9 and 19.4, while the human bone reached the high average of 168.9. Turning again to the table on page 447, we will see that this ratio was increased in the case of bones known to be modern to 193.1. This, therefore, bears out the contention of the value of this test—it shows two things, (1) that according to the averages made by Mons. Carnot, the bones under present consideration, the man and the mylodon, are substantially of the same antiquity, and (2) by the same comparison their antiquity is about midway between the modern bones and those of the Quaternary geologic epoch.

This investigation will be carried further by making analyses of other bones, some of which will be modern, some of known, and others of supposed antiquity.

CONTRIBUTIONS TO COCCIDOLOGY.—I.

BY T. D. A. COCKERELL,

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The present is the first of a proposed series of papers on Coccidæ (Scale Insects); intended to make known some of the numerous new facts, especially regarding their distribution, which are constantly coming to light. The ever increasing traffic in living plants, which is going on in nearly every part of the world, is leading to the wide dispersal of injurious Coccidæ. No one who has not given particular attention to this matter can realize the serious nature of the situation, from an economic point of view. Not only is the number of harmful Coccidæ in each locality being greatly increased by importations, but, as is well-known, the imported species often show a

marked tendency to become more destructive than in their native habitat.

If the naturalist, pure and simple, on reading these lines should say that the matter does not concern him, but the horticulturist, he is begged to remember the bearing of these changes on questions of geographical distribution. If, ignorant of what is going on through man's energy, he proceeds to collect Coccidæ and argue about their distribution, he will arrive at the most extraordinary conclusions, and will, perhaps, be asking for sunken continents to explain phenomena which had no existence twenty-five years ago!

The notes given will be placed under sub-heads indicating the several countries, states or districts. Species marked * are new to the region indicated by the sub-head. This merely means that they are first found there, whether on wild or cultivated plants, out of doors or in hothouses. But native and introduced species will not be placed under the same sub-head if it can be avoided; when we do not know whether a species is native or not, it will be assumed for the present to be so. (N.)=native. (I.)=introduced.

With reference to food plants the following abbreviations will be used: (n. p.)=new food plant; (n. g. p.)=new genus of food plants; (n. o. p.)=new natural order of food plants. Coll.=collected by; com.=communicated by; cp.=compare; used in indicating useful references.

Types of all new species described will become the property of the U. S. National Museum.

ANTIGUA, WEST INDIES.

While we have no positive information to guide us, I believe the following species have been introduced. They were all coll. Mr. Barber, Superintendent of Agriculture of the Leeward Institute (cp. Ins. Life, VI, 50-51.)

Aspidiotus destructor Signoret. On leaves of banana at Clare Hall; also on cocoanut, Jan. 15, 1895.

Aspidiotus personatus Comst. A few on rose leaves, and many on *Ficus* sp. near *benjamina* (cp. Jn. Inst., Jamaica, 1892, 54). This is the fifth *Aspidiotus* found on rose, the others being *A. fiscus*, *A. articulatus*, *A. dictyospermi* var. *jamaicensis*, and *A. perniciosus*.

**Ceroplastes floridensis* Comst. Several on fern leaves (n. o. p., but cp. supposed *C. vinsoni*, in Timehri, Dec., 1889, p. 309, fig. 3). The fifth *Ceroplastes* found in Antigua.

Lecanium hemisphaericum Targ. A few on fern leaves (cp. Bull. Bot. Dep. Jamaica, 1894, p. 71).

Lecanium oleae (Bern.). Brown variety. One on fern leaf. (Also found on leaves of a fern in hothouse, Denver, Colo., by Prof. Gillette, the fern in this case being *Platyserium alcicorne*).

TRINIDAD, WEST INDIES.

The first two are certainly, I think, native; the third probably native, the fourth certainly introduced. All were coll. Mr. J. H. Hart in 1895.

**Icerya rosae* Riley & Howard. Sent in quantity, from the base of a tree of *Amherstia nobilis*, "covered up by small caverns of earth by a species of small ant that no doubt was interested in so doing. The scale was not perceived above ground at all, but on the roots there were plenty of several sizes." (Hart in litt.) This was on Jan. 26.

Vinsonia stellifera (Westw.). On *Stanhopea* (n. g. p.). "Fairly common here but causes little trouble." (Hart in litt.) There appear to be good reasons for believing that this is properly a neotropical species.

Othieria insignis Dougl. In numbers on leaves of lime (n. p.), "quite a pest." (Hart in litt.) (Also found by Professor Townsend on lime and orange in Mexico, as will be set forth in a report shortly to be issued. The insect is to be dreaded as a pest of *Citrus* fruits in the warmer parts of the U. S.; already it is well known in this country as a greenhouse species (cp. Mr. Lounsbury's paper, lately sent out from the Amherst, Mass., College), and may very easily be transferred thence to out-of-door plants in the South. In Ceylon it has also appeared, and Mr. E. E. Green has found the true ♂—the presumed ♂ of this species, found by Douglas and Lounsbury, being apparently those of *Dactylopius*. It is hard to explain why the true ♂ (with caudal tuft) has not been seen in America, unless it is that the insect reproduces parthenogenetically with us. It may here be remarked that *Ortheria edwardsii* Ashmead, described only from the ♂, is pretty clearly no *Ortheria*.

Chionaspis citri Comst. • "Is the pest of our lime trees here." (Hart in litt.) This extremely pernicious species has not yet spread generally through the West Indies, being still unknown, for example, in Jamaica.

COLORADO (I.).

The following species have lately been sent to me from Colorado hothouses by Prof. Gillette. I refrain from giving details as Prof. Gillette will shortly publish the full records in a paper on the Hemiptera of Colorado.

* (1.) In greenhouse at Fort Collins: *Lecanium hesperidum* (L.), *Aspidiotus nerii* (Bouché), *A. dictyospermi* Morg., *A. rapax* Comst.

* (2.) In greenhouse at Denver: *Lecanium oleæ* (Bern.), *L. longulum* Dougl., *L. hemisphæricum* Targ., *L. perforatum* Newst., *Aspidiotus ficus* (Ashm.), *A. dictyospermi* Morg., *Aulacaspis boisduvalii* (Sign.).

(Thus, ten species between the two hothouses! The *A. dictyospermi* is a species originally from Demerara; I found it last year on a palm in Mr. Boyle's hothouse at Santa Fe, New Mexico. *A. rapax* is the *camelliae* of Signoret, but hardly that of Boisduval, vide Morgan, Ent. Mo. Mag., 1889, p. 351. Since Signoret intended no new species, but only Boisduval's, by his name *camelliae*, it is apparent that the name proposed by Comstock has a right to stand.)

It may be here added that Prof. Gillette also sent me *Aspidiotus perniciosus* Comst., found on pears purchased (but not raised) in Fort Collins, Colorado.

NEW MEXICO (N.).

Lecaniodiaspis yuccæ Twms. I have lately found several of this species on Little Mountain, Mesilla Valley, living on *Parthenium incanum* (n. o. p.) mixed with *Tachardia cornuta* Ckll.

Coccus confusus Ckll. Mr. A. Holt has found this close to the Agricultural College, on *Opuntia leptocaulis* DC. (n. p.), the plant determined for me by Prof. Wooton. (At Tucson, Arizona, Prof. Toumey finds *C. confusus* on *Opuntia versicolor* Engelm.)

**Dactylopius solani* var. nov. *atriplicis*. On *Atriplex canescens* close to the Agricultural College, Sept., 1894, living on the twigs and branches.

♀. Size of *D. citri*; pale greenish, sparsely mealy, no lateral processes; forming no ovisac, but a cushion of white cottony matter, in which are seen lively young.

Mr. Joseph Bennett, who was a student of the college at the time of the discovery of this insect, prepared specimens of the ♀, and drew up the following description:

"Derm clear transparent. Form oval, slightly obovate. Leg: coxa rather short, about as broad as long; trochanter rather large, about half as long as coxa and two-thirds as broad as long; femur about one and a half times as long as coxa, and about two-thirds as broad as coxa; tibia about as long as femur, and half as thick; tarsus two-fifths as long as tibia and very near as thick, tapering to half as thick, claw very small. Anal ring with six hairs. Antenna 8-jointed; 1 short and thick, 2 about as long as 1, 3 much longer than 2; 4, 5, 6 about equal in length, about one-third as long as 3 and same thickness; 7 a little longer than 6; 8 as long as 3+4. Formula 83 (21) 7 (654). Each joint emits numerous hairs, those on final joint being longest." (J. Bennett.)

♂. Mr. Bennett had the good fortune to find the ♂, of which I noted the following characters:

Very small, about 1 mm. long, dark sage-green or greenish-gray, legs and antennæ brownish; caudal filaments only about as long as abdomen, thick, snow-white from secretion; wings semitransparent milky-white.

The typical *D. solani* lives on the roots of *solanum* underground; and differs from the var. *atriplicis* in lacking the greenish color, and in the second joint of the antennæ being somewhat longer than the third. (The typical *D. solani*, hitherto known only from New Mexico, is to be added to the fauna of Colorado, having been found on roots of *Solanum rostratum* (n. p.) at Fort Collins, coll. C. F. Baker, com. Gillette. Found originally on potatoes grown in the Mesilla Valley, it was not feared as a potato pest, since the potato is not grown as a regular crop. It may, however, prove quite otherwise at

Fort Collins, where, I understand from Prof. Gillette, the potato is one of the leading crops. Yet it is probable that the disturbance of the land in the cultivation of potatoes would prevent the over-abundance of *D. solani*.)

Atriplex canescens has proved a mine of wealth to the coccidologist. The following species are found on it in the Mesilla Valley, n. m.: *Dactylopius solani* var. *artriplicis* Ckll., *Lecaniodiaspis* (*Prosopophora*) *yuccæ* var. *rufescens* (Ckll.), *Ortheria annæ* Ckll., *Mytilaspis albus* var. *concolor* Ckll., *Ceroplastes irregularis* Ckll.

**Ortheria nigrocincta* n. sp. On narrow leaves, apparently of a species of Compositæ, Gila Hot Springs, N. M., July 20, 1894, coll. C. H. T. Townsend. When Prof. Townsend gave me this insect, I supposed it was only *O. annæ*, but a careful comparison reveals the following good distinctive characters:

♀. Length, with ovisac, 4 mm., breadth 2 mm.; ovisac pure chalk-white, firmer than in *annæ*, longitudinally ridged above. Body (dried) coal-black, legs dark brown, antennæ reddish-brown. Sides, between dorsal and lateral lamellæ, broadly black from the exposed body, Anterior dorsal lamellæ broader antero-posteriorly than in *annæ*. Posterior lamellæ much as in *annæ*, free from ovisac, but not so rapidly increasing in length mesad; the innermost one not being greatly longer than the outermost.

Another allied species is *O. sonorensis*, which will be described in Prof. Townsend's report on his recent trip in Mexico. The following table will separate the three:

A. Length with ovisac over 5 mm.

1. Posterior lamellæ about equal in length; a small portion of hind-dorsum free from secretion, *sonorensis* Ckll.
2. Posterior lamellæ successively longer mesad, the innermost at least twice as long as the outermost; dorsum covered by secretion, *annæ* Ckll.

B. Length with ovisac under 5 mm., sides of dorsum naked, *nigrocincta* Ckll.

**Chionaspis pinifolii* (Fitch). Last December I found this scale on some pine branches brought from the Organ Mountains. (It is doubtless native on the pines of the Rocky Moun-

tain region. Prof. Gillette has found it at Manitou, Colorado; the specimens from this locality vary, some having the exuviae very pale yellow, as in examples found by Mr. Petit at Ithaca, N. Y., while others, constituting a mut. nov. *semiaureus*, have the exuviae bright orange.)

JAMAICA, WEST INDIES (I.).

**Ceroplastes ceriferus* (Anders). Mr. W. Harris sends me specimens from Jamaica on burweed, *Triumfetta rhomboidea* Jacq. (n. g. p.). They were found at Cinchona on March 15, 1895. These scales differ a little from typical *ceriferus*, being very white, yet I cannot separate them specifically. The derm has very large oval gland pores, and is obscurely tessellated. The digitules of the claw are very stout, with large knobs; those of the tarsus long, moderately slender, with large knobs. (The only West Indian locality before known for the species is Antigua.)

**Icerya montserratensis* Riley & Howd. There were in the Jamaica museum some fragments of a coccid marked "19 Feb., 1886. No. 740. J. Hart." I brought away a portion of this material when I left Jamaica, as it was evidently something I had never found in the island; and on recently subjecting it to careful examination, I find it to be *I. montserratensis*. It differs from the type of that species in no important respect, though the club of the antennae is not as long as the three preceding joints together. The antennae are very large, 11-jointed. The ovisac is long, yellowish-white, strongly grooved. Mr. Hart, now of Trinidad, formerly lived in Jamaica, and presumably found these specimens there. It is curious that I never met with the species, if it has been introduced into the island.

NEW YORK STATE (N.).

Aspidiotus ancylus Putnam (cp. Comstock, 2d Cornell Rep., p. 59). Dr. Lintner sent me some of this from Albany, found several years ago on black currant (n. p.) in his garden.

Lecanium ribis Fitch. Dr. Lintner sent me specimens found in June, 1885 by Hon. G. W. Clinton, in Albany Rural Cemetery, on *Ostrya* (n. g. p.) and *Carpinus* (n. g. p.). Comparison

of these with examples from *Ribes* showed no valid distinction. This species may be readily known by its small size (long. 3, lat. 2, alt. $2\frac{1}{4}$ mm., looking a little like *L. hemisphæricum*), red-brown color; derm with large gland-pits, frequently in pairs; antennæ 6-jointed, 3 as long or longer than 4+5+6. The digitules of the claw are remarkably stout, but very little expanded at their ends.

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